

### **Automated Stream Data Notes: Mar 2012- Oct 2012**

Five stream sites had water quality sensors reinstalled after ice-out in March of 2012. Miller Creek was re-installed in April. Very little winter snow cover resulted in very little snow melt runoff in March, which, when combined with little to no precipitation in April, resulted in unusually low spring stream levels. In May the weather patterns changed and three rain events produced 5.7" (87%) of the 6.6" recorded for the month. June was on track for normal rain totals with 2.3" prior to the deluge of 6/19 and 6/20 which dropped 7+inches of rain in 24 hours. This June "Duluth 2012 Solstice Flood" wreaked havoc with the stream monitoring stations, the stream channels and many parts of the city stormwater infrastructure (more from **USGS LINK** , **City of Duluth**, **LINK**, **National Weather Service**, and **UM-Climatology Center LINK**. July through Oct precipitation was nearly 8" below normal (???" is normal) while summer average temperature set a record in Duluth for the warmest ever (since 18??). These factors resulted in very low base flow conditions throughout the summer and fall.

Duluth and some surrounding towns were formally declared a disaster area in the aftermath of the solstice storm floods. The monitoring equipment that was destroyed has yet to be replaced, for the most part. Monitoring instrumentation was cobbled together and data was collected but this required labor intensive and inefficient methods. This, coupled with the lack of a regular maintenance budget for 2012, necessitated early removal of the monitoring equipment this fall.

#### **Amity Creek:**

The sonde returned to service in early March and was fully functional prior to the solstice storm. The sonde and cable were mangled by the solstice flood and both the turbidity sensor and the sonde cable, as well as the base it was secured to, required replacement. The MPCA owned ultrasonic depth sensor was destroyed and replaced with a pressure transducer though significant changes to the stream profile have invalidated the stage height/flow relationship. The sonde and cable were cobbled back together with spare parts and re-installed in the stream in mid-July after the city bridge inspector informed us that no remediation work on the bridge would be done in 2012. The changed channel and low flow conditions required moving the sonde into a slightly different position for the remainder of the summer where it has been functioning normally. No vandalism has occurred. The heavy sediment load of Amity is consistent with the stream's federal/state listing as being Impaired ([lakesuperiorstreams.org/weber/index.html](http://lakesuperiorstreams.org/weber/index.html)) for turbidity due to excess sediment loading.

#### **Chester Creek:**

The sonde returned to service in early March and was fully functional prior to the solstice storm. The storm flooded the electronics box destroying the sonde/modem interface and the modem. The sonde was buried beneath a log and debris dam 8' tall but survived undamaged. After its recovery from beneath the debris dam it was wired to a battery and placed into unattended logging mode with the data manually downloaded approximately weekly. At this time it was redeployed 10m upstream, away from the unstable debris dam, until the water dried up due to the drought and the deposition of a large amount of unconsolidated cobble through which the stream ran. It was removed for most of September and part of October. After struggling to fix some issues in late October it was removed for the winter.

**Tischer Creek:** The sonde returned to service in early March and was fully functional prior to the solstice storm. The storm flooded the electronics box destroying the sonde/modem interface and the modem. The sonde was buried beneath a foot of cobble but survived undamaged. After its recovery it was wired to a battery and placed into unattended logging mode with the data manually downloaded approximately weekly. It recorded data from June 29 through the end of October when it was removed due to maintenance budget constraints and to avoid the risk of damage due to freeze up while base flows were low.

**Kingsbury Creek:**

The sonde returned to service in late March after the other stream units because it had ice laminated much thicker than the other streams and was slow to melt. It was fully functional prior to the solstice storm in June. The storm flooded the electronics box destroying the sonde/modem interface and the modem. The sonde and electronics box were buried beneath several feet of sand and cobble- the sonde survived but the rest was destroyed. After its recovery from beneath the cobble the sonde was wired to a battery and placed into unattended logging mode with the data downloaded approximately weekly. It recorded data from June 29 through the end of October when it was removed due to maintenance budget constraints and the coming winter..

**Miller Creek (@ Lake Superior College):**

This site was returned to the creek June 20 and operated fully until the solstice flood. It, along with the bridge it was attached to, was swept downstream about 1500 meters and broken into many pieces- most of which were recovered albeit in unusable form. The new equipment has been purchased although it was not installed this fall. Maintenance and operation of the unit has been the responsibility of Lake Superior College (owners of the equipment) and the college has included this in an employee's duties for the coming year..

**Poplar River:**

Poplar River data collection was terminated 10/7/08 due to a lack of funding.

**Duluth Inlet Ship Canal:**

The water quality sonde has operated throughout the summer and the required weekly maintenance has been more consistent. Some of the effects on the harbor resulting from the solstice storm were recorded nicely at this location. This effort has been funded by a grant from the U. of Minnesota's Institute on the Environment to the Large Lakes Observatory at UM-Duluth as part of a Global Great Lakes ( [www.globalgreatlakes.org](http://www.globalgreatlakes.org) ) project. We are grateful to USGS's collaboration which has provided us with the use of their data logger and modem as well as direct access to their real-time velocity data. A similar instrumentation package was installed in the Superior Inlet in October for testing and will be re-installed next spring.